Program Commitment Agreement

Checkout and Launch Control System (CLCS)

84K00007

It is the responsibility of each of the signing parties to notify the other in the event that a commitment cannot be met, and to initiate the timely renegotiation of the terms of this agreement

Agreements:

Retha Hart
Project Manager, CLCS   4-10-97
                                                              Date

R B Sieck
Director of Shuttle Processing   4/10/97
                                                              Date

Director, Implementing Center   4-10-97
                                                              Date

Manager, Shuttle Program   6-3-97
                                                              Date

George W. S. Abbey
Director, Lead Center   6-3-97
                                                              Date

PROGRAM COMMITMENT AGREEMENT

CHECKOUT AND LAUNCH CONTROL SYSTEM (CLCS)

1.0   PROGRAM OBJECTIVES

The current Launch Processing System (LPS) supporting the Shuttle Program is 1970's technology. It suffers from reliability and obsolescence problems and has serious expansion limitations. The objective of the CLCS is to ensure continued safe and dependable Shuttle launch support by replacing the current Launch Processing System with state-of-the art technology and providing the building blocks for future endeavors.

The CLCS will be a modern, standardized system that redefines the Shuttle processing environment in several key areas which will improve checkout efficiencies. With improved reliability, changes in maintenance philosophies, reduction in facilities to be maintained, and new ways of doing business, the CLCS Project will achieve significant reductions in Shuttle operational costs.

2.0   PROGRAM OVERVIEW

For almost 10 years, obsolescence and reliability issues have been resolved through the LPS Survivability Project. Following the realization that this effort could not be continued forever without some significant intensification, an LPS Upgrade Review Team (LURT) was formed in April 1996 to explore different options for the future of LPS. The resulting recommendation was to provide a new LPS where the strategies emphasized were to 1) leverage technology and products, 2) re-engineer the applications software, 3) employ rapid development (build a little, test a little), and 4) provide system capability that supports future flight element upgrades and improvements to shuttle processing.

A 60-day pilot team was authorized in June 1996 to define features of the new system, an operations concept, a delivery concept, a work breakdown structure, and a cost estimate. The 60-day team completed their work in August 1996 and a project team was organized to expand these concepts into a project plan to advance the proposal towards reality.

CLCS is a NASA-managed, re-engineering activity, with contractor support provided under existing NASA contracts to capitalize on available expertise. The project has an aggressive, success driven, product oriented, five-year schedule with deliveries to the end user every six months. Leveraging technology and products from existing, similar developments (including Mission Control Center at JSC), and employing COTS products and industry standards are key factors in achieving schedule and resource commitments.

Each six months a delivery will be made providing additional system capability that is built on top of the previous deliveries. This approach provides valuable insight for Project Management to accurately assess project status and even more important, it provides a strong motivational factor for the development team as progress is made clearly visible.

3.0   TECHNICAL AND SCHEDULE COMMITMENTS

CLCS is committed to providing a system with the flexibility required to allow shuttle processing to be achieved "the smart way", taking advantage of what today's technology has to offer. This includes providing multi-orbiter support from one control room, multi-system monitoring capability from one console, and local monitoring, command, and control of systems where operational efficiencies can be achieved. The project commits to reduce the number of engineers required on console for daily power-up operations by 50%. The project commits to reduce the amount of paper documentation required in the control rooms by 50%. The project commits to reduce O&M costs by 50% by increasing console MTBF from 70 hours to 10,000 hours, by decreasing the amount of hardware from 8 control rooms to 6, by using standard COTS software and reducing custom software from 12 million lines of code to 3.3 million, and by designing for system components to be returned to vendor while maintaining 100% daily support capability. The project is additionally committed to controlling development costs by leveraging commercial and government owned technology. Using industry standards will help minimize development time today, and support more rapid and economical system upgrades in the future thus enabling CLCS to support through the end of the Shuttle Program and to be easily adaptable to support future space vehicles.

The project is committed to achieving successful completion within five years ending in FY2001. The critical path for CLCS is the development , test, and certification of application software. Key milestones for application software development are part of an integrated package which composes each incremental delivery. Included in that package are additional milestones for facility modifications and transition. CLCS will be launch capable in December 2000. The following list identifies several of the milestones to which the CLCS project is committed:

Experimental Control Room Established	03/97
System Level Specifications Baselined	04/97
Ready to Support Super Light Weight Tanking Test	09/97
Console Enclosure Critical Design Review	09/97
Gateway H/W Critical Design Review	01/98
COTS Preliminary Design Review	05/98
Software Portability Demonstrated	05/98
SAIL (CLCS) available for software development	06/98
Demo of Auto Command and Control of Orbiter Power-up	09/98
Hypergolic Maintenance Facility ready for user acceptance	12/98
CDS Decommissioned	01/99
All OPF Application S/W Validated	03/00
CITE Fully Operational	03/00
Shuttle Element "No Impact" Assurance Review	06/00
First Complete CLCS Shuttle Processing Flow Begins	08/00
CLCS Launch Capable (1st CLCS Control Room)	12/00
2nd CLCS Control Room Fully Operational	04/01
3rd CLCS Control Room and CCS Fully Operational	09/01

4.0   RESOURCE COMMITMENTS

Program Cost Commitments (PCC), $M for CLCS

Cost Commitment Category	FY97	FY98	FY99	FY00	FY01	FY02	Total
Contractor Labor	10.0	25.6	30.0	22.8	10.0	0.0	98.4
Materials (Non-labor)	9.8	12.4	17.3	10.6	4.1	0.0	54.2
Facility Mods (Non-labor)	.9	1.3	1.2	1.0	1.0	0.0	5.4
Travel & Training (Non-labor)	1.0	.7	.9	.9	.7	0.0	4.2
H/W & COTS S/W Maint. (Non-labor)	0	.4	1.7	2.9	4.2	0.0	9.2
Sub Total	**21.7**	**40.4**	**51.1**	**38.2**	**20.0**	**0.0**	**171.4**
Program Reserves	0.0	0.0	0.0	8.0	14.0	12.3	34.3
Total	**21.7**	**40.4**	**51.1**	**46.2**	**34.0**	**12.3**	**205.7**

5.0   PROGRAMMATIC RISK

CLCS is a complex real time command and control environment in support of critical, high energy systems. Technical risk associated with custom software development is mitigated by the availability of expertise on the existing LPS, the use of COTS and industry standards, and the leveraging of technology from MCC and other similar checkout and control systems. The basis of estimate for CLCS costs have been reviewed by program personnel from JSC and deemed to be adequate. In addition, the Shuttle program has established a reserve for the project of 20%. CLCS will be compatible with and will pose no impact to existing Shuttle, GSE and external interfaces. CLCS will establish measurements to monitor the progress towards achieving the commitments described herein.

There would, of course, be an impact to the schedule and cost of the project should the program change the funding structure already established.

There are 12 million lines of code in 3800 applications programs to be re-engineered and totally rewritten in a new language. There will be a tendency on the part of the user community to enhance and expand system requirements. Certain enhancements will be allowed if the benefits are substantial and the work can be accomplished so as to not impact the CLCS overall delivery schedule. A CLCS requirements control board will be established to approve changes to baseline requirements to control and mitigate this risk internally. Programmatically, existing requirements control boards will be utilized to the maximum extent possible. The requirements control board, utilizing its corporate knowledge of these existing application requirements, will approve changes to baseline requirements and thereby control and mitigate this risk.

KSC management has reduced supportability risk by identifying CLCS as a high priority project for the Center. In the area of support, facilities and communications modifications are the predominate threats to the schedule. The project team is identifying requirements early and obtaining commitments from supporting organizations to mitigate

this risk. Award fee evaluation will serve as an additional motivator for SFOC management.

6.0   INTERNAL NASA AGREEMENTS

After initial baselining of this PCA, the monitoring of progress against this PCA will be delegated to the Lead Center PMC.

The CLCS is handled completely within the Shuttle Program. The high-level architecture and functionality proposed for CLCS is similar to those architectures that exist or are being developed at other NASA and DOD Centers. In keeping with the charter for which SOMO was organized, to promote synergy and commonality across the development and operations of the different NASA Centers (thus reducing overall project costs), the CLCS Project envisions utilizing SOMO as a resource for information on CLCS-like Projects at those other Centers. In addition, CLCS Management and Engineering personnel will provide CLCS design and implementation information to the SOMO organization for retention in the SOMO Information Database and for analysis for commonality within the Agency.

Prior to the first complete CLCS Shuttle processing flow, a review will be conducted to provide the assurance that CLCS has no impact to flight elements.

7.0   EXTERNAL AGREEMENTS.

None.

8.0   PCA ACTIVITIES LOG.

PCA ACTIVITIES LOG

Date	Event	Change	Addendum	Cancellation Review Req'd	PAA Signature	Administrator Signature

END